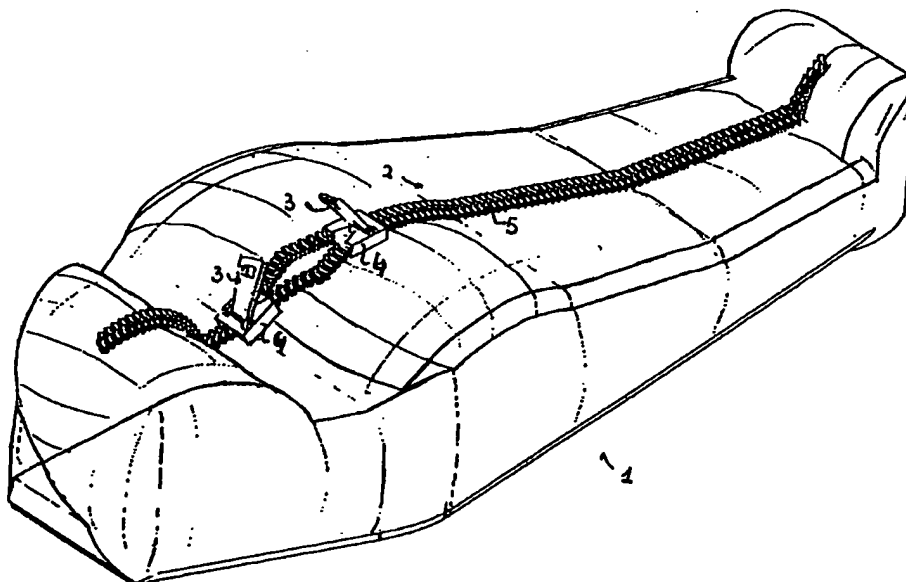




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶ : A61G 17/06	A1	(11) International Publication Number: WO 99/15128
		(43) International Publication Date: 1 April 1999 (01.04.99)
<p>(21) International Application Number: PCT/NL98/00545</p> <p>(22) International Filing Date: 21 September 1998 (21.09.98)</p> <p>(30) Priority Data: 1007091 22 September 1997 (22.09.97) NL</p> <p>(71)(72) Applicant and Inventor: JONKER, Johannes, Cornelis [NL/NL]; p/a Hoofdweg 180, NL-2908 LC Capelle a/d IJssel (NL).</p> <p>(74) Agents: HOOIVELD, Arjen, Jan, Winfried et al.; Arnold & Siedsma, Sweelinckplein 1, NL-2517 GK The Hague (NL).</p>		<p>(81) Designated States: AU, CA, CN, JP, US, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).</p> <p>Published With international search report. In English translation (filed in Dutch).</p>

(54) Title: A CONTAINER PROVIDED WITH A ZIPPER OF A BIODEGRADABLE MATERIAL AND A ZIPPER THEREFOR



(57) Abstract

A container substantially made of a flexible material, which comprises a sealable opening and a zipper for sealing said opening substantially air-tight, which zipper is provided along at least one part of the edge of said opening, wherein said zipper is made of a biodegradable material.

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A CONTAINER PROVIDED WITH A ZIPPER OF A BIODEGRADABLE MATERIAL AND A ZIPPER THEREFOR

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The invention substantially relates to a container substantially made of a flexible material, which comprises a sealable opening and a zipper for sealing said opening substantially air-tight, which zipper is provided along at least one part of the edge of said opening.

Containers of this type are generally known.

Such a known container is sealed air-tight, in particular odour-tight.

One drawback of such known hermetically sealed containers is that they must be treated mechanically in a first step in order for their contacts to come into contact with the environment. Such hermetically sealed containers, in particular if said containers are waste containers, are dumped at a waste disposal site and/or covered with a layer of material. Such containers generally contain gas-forming products, in particular of a reactive nature.

Thus there is a demand for safe containers, which seal their contents air-tight for only a specified and limited period of time.

The object of the invention is to provide a solution for this problem, and in order to accomplish that objective it provides a container of the kind referred to above, wherein the zipper is made of a biodegradable material.

A container according to the invention is capable of sealing its contents air-tight, in particular odour-

tight. When the zipper of a container according to the invention is placed in an environment which is suitable for biodegradation of the biodegradable material, for example when it is placed in the ground or covered with a layer of earth, for example, a biodegradation process will take place, as a result of which the container will at least partially open, so that its contents, in particular the gases it contains, are brought into contact with the environment, as a result of which micro-organisms can effect further biodegradation. When a container according to the invention is present in an environment which is not suitable for biodegradation, the air-tight seal will be maintained.

Biodegradable closing elements in the form of a complementary snap-fit closure are known per se from EP 0 389 130, but a zipper is to be preferred, since it provides a reliable, airtight sealing element for the container, which enables re-sealing.

It is noted that zippers are likewise generally known per se, inter alia from publications EP-A-0 078 013 and EP-A-0 099 484, and also from German industrial standard DIN 3416.

A container according to the invention preferably has a length of 1.5 - 2.5 m, wherein the zipper extends along more than half the length of the container. Preferably, the maximum volume of such a container ranges between 5 l and 2000 l, preferably between 25 l and 500 l.

Generally it concerns waste containers having a considerable volume, as a result of which the ratio between the maximum volume of such a container and the volume of the contents of the container is optimized.

Preferably, the container is likewise made of a

substantially biodegradable polymer. As a result of this, besides the zipper, also the container will be degraded in the same biodegradation environment. This provides an additional advantage in controlling the accumulation of waste.

Biodegradable polymers have a limited life, which can be adjusted according to the circumstances. They are capable of undergoing a natural degradation process via digestion processes of living organisms, in particular fungi and bacteria. In the presence of oxygen this results in the production of carbon dioxide, water, biomass and minerals, under anaerobic conditions also methane can be produced.

It is noted that biodegradable polymers are already known per se from WO 96/08535, WO 92/14782, US-A-4,393,167 and US-A-4,880,592.

Biodegradable polymers are generally thermoplastic, and they can be processed via injection moulding operations, extrusion operations or other known techniques.

Such biodegradable polymers are known on the market, inter alia Mater-Bi of Novamont, S.p.A, in particular type Y101U, Bioflex of Biotec, in particular type FF102, Biopol of Monsanto plc., in particular types D300G, D311G, D400G, D411G, D600G, D611G, Bionolle of Showa Highpolymer Co. Ltd., and EcoPLA of Cargill Inc., in particular types 1100D, 3000D/3300D.

The invention furthermore relates to a zipper for interconnecting edges of a flexible material, wherein said zipper is made of a biodegradable material.

Preferably, the same aforesaid biodegradable polymers are also used for manufacturing a zipper, in particular

the zipper according to the invention.

The biodegradable polymer for the zipper is preferably a polymer with a base of starch and caprolacton or a polymer with a base of the copolymer polyhydroxybutyrate/valerate. Such biodegradable polymers are in particular advantageous as regards their thermal forming processes.

- 10 The invention furthermore relates to a method for temporarily packaging material in a container substantially made of a flexible material, wherein the material is introduced into the container through a closable opening and said container is sealed
- 15 substantially air-tight by means of a zipper, wherein said zipper is made of a biodegradable material.

- Said method can be used advantageously in particular for temporarily storing a human or animal body in a
- 20 container according to the present invention. Such a container, generally called a body bag, of a substantially biodegradable material provided with a zipper of a biodegradable polymer, will be degraded at least substantially completely in a degradation
- 25 environment, for example in the ground.

- The invention furthermore relates to a bodily fluid-tight (sealing) article of clothing of a substantially biodegradable material, which comprises at least one
- 30 biodegradable zipper. Such an article of clothing may for example be used in laying out dead persons, in order to prevent bodily fluids (for example caused by the removal of donated organs or by abductions) flowing out, to which end the article of clothing must join the body
- 35 closely at its edges. To this end, the article of clothing is provided with a biodegradable zipper, in particular at the sleeves, near the ankle openings in

the trousers, and also near the neck thereof. The articles of clothing will likewise be degraded, at least substantially completely so, in the aforesaid degradation environment. The bodily fluid-tight article of clothing may be made in one piece, whilst in another preferred variant the trousers and the jacket are separate items, which can be sealed at the upper side and at the lower side respectively by means of zippers according to the invention.

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The invention will be explained in more detail hereafter with reference to the drawing, which shows a preferred embodiment of a container according to the present invention.

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Figure 1 is a perspective view of a container according to the invention in the form of a body bag 1 of a flexible material, preferably a biodegradable material. Body bag 1 is generally elongated, its length ranging between 1.5 and 2.5 m, whereby zipper 2 extends substantially along the length of body bag 1. Zipper 2 comprises the closing elements: lips 3, which are connected to sliding members 4, which couple or uncouple teeth or spirals 5 to form an air-tight seal.

Preferably, all closing elements, but at least one closing element, is made of a biodegradable material. Preferably, all the parts of such a body bag 1 are made of a biodegradable polymer. Such a polymer with a base of starch and polycaprolacton or with a base of the copolymer polyhydroxybutyrate/valera or with a base of polylactic acids can be applied by means of a simple injection moulding or extrusion operation.

When a human or animal body is placed in such a body bag, which is subsequently sealed, the contents of said body bag will be sealed air-tight during the time the body bag is present in an environment which is not

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suitable for biodegradation, for example a chilled room. During transport, for example via a hearse or in aeroplanes, which are generally environments which are not suitable for biodegradation, either, the contents of
5 such a container will remain sealed air-tight, in particular odour-tight.

When the container is placed in an environment which is suitable for biodegradation, quick and efficient
10 degradation of the zipper will ensue, and the contents will come into contact with its environment via the opening that has been released. In a suitable environment, such biodegradation will take place very quickly, for example within a few weeks.

15 If the container is likewise made of a biodegradable polymer, substantially no residual product of the container and the zipper will remain after biodegradation, and the further degradation process of
20 the body will be accelerated.

Such a body bag is composed of natural products and complies with the applicable national and international rules. As far as the Netherlands is concerned,
25 Lijkomhulselbesluit Nr. BW98/U64 dd. 15 January 1998 applies, in particular subsections 1 and 4 of section 2 thereof.

section 2.1. Permeability

30 a. to water:

During seven days of continuous contact with water of 5 - 20 °C at a pH value of 7.0, the material must not allow more than 1 mg of liquid water to pass through per square metre per hour, measured in
35 accordance with standard DIN 53122 or a comparable standard.

b. to gas:

- After fourteen days, the permeability to gaseous carbon dioxide, measured in accordance with standard DIN 53122 or a comparable standard, must not be less than 150 ml per square metre per hour, and to oxygen it must not be less than 200 ml per square metre per hour.

section 2.4. Biodegradability

- More than 98% of the material of the body bags must be degraded within 90 days, measured in accordance with standard ASTM: d 5338-92, or a comparable standard. In addition, no harmful substances must be released by the body bags upon biodegradation, nor upon cremation. As far as heavy metals (Pb, Cr, Ni, Cu, Cd, Zn) and chlorinated hydrocarbons are concerned, German Bundesgütegemeinschaft standard RAL GZ 251 or a comparable standard applies. Verification of compliance is to be carried out by using standard ASTM: D 5152-91 or a comparable standard.
- Upon incineration, a body bag according to the invention will not release any compounds which are harmful to the environment, such as chlorine compounds, dioxins or heavy metals.

CLAIMS

1. A container substantially made of a flexible material, which comprises a sealable opening and a zipper for sealing said opening substantially air-tight, which zipper is provided along at least one part of the edge of said opening, wherein said zipper is made of a biodegradable material.
2. A container according to claim 1, characterized in that said container is elongated, having a length of 1.5 - 2.5 m, wherein the zipper extends along more than half the length of the container.
3. A container according to claim 1 or 2, characterized in that the maximum volume of said container ranges between 5 l and 2000 l, preferably between 20 l and 500 l.
4. A container according to any one of the claims 1 - 3, characterized in that the material of said container substantially consists of a polymer.
5. A container according to claim 4, characterized in that the material of said container substantially consists of a biodegradable polymer.
6. A container according to claim 5, characterized in that said biodegradable polymer is selected from the group comprising cellulose, starch, polyhydroxoalkanoates, polyurethanes derived from aliphatic polyesters, polylactic acids, polycaprolacton or mixtures thereof, alternatively with addition of one or more softeners.
7. A zipper for interconnecting edges of a flexible material, wherein said zipper is made of a

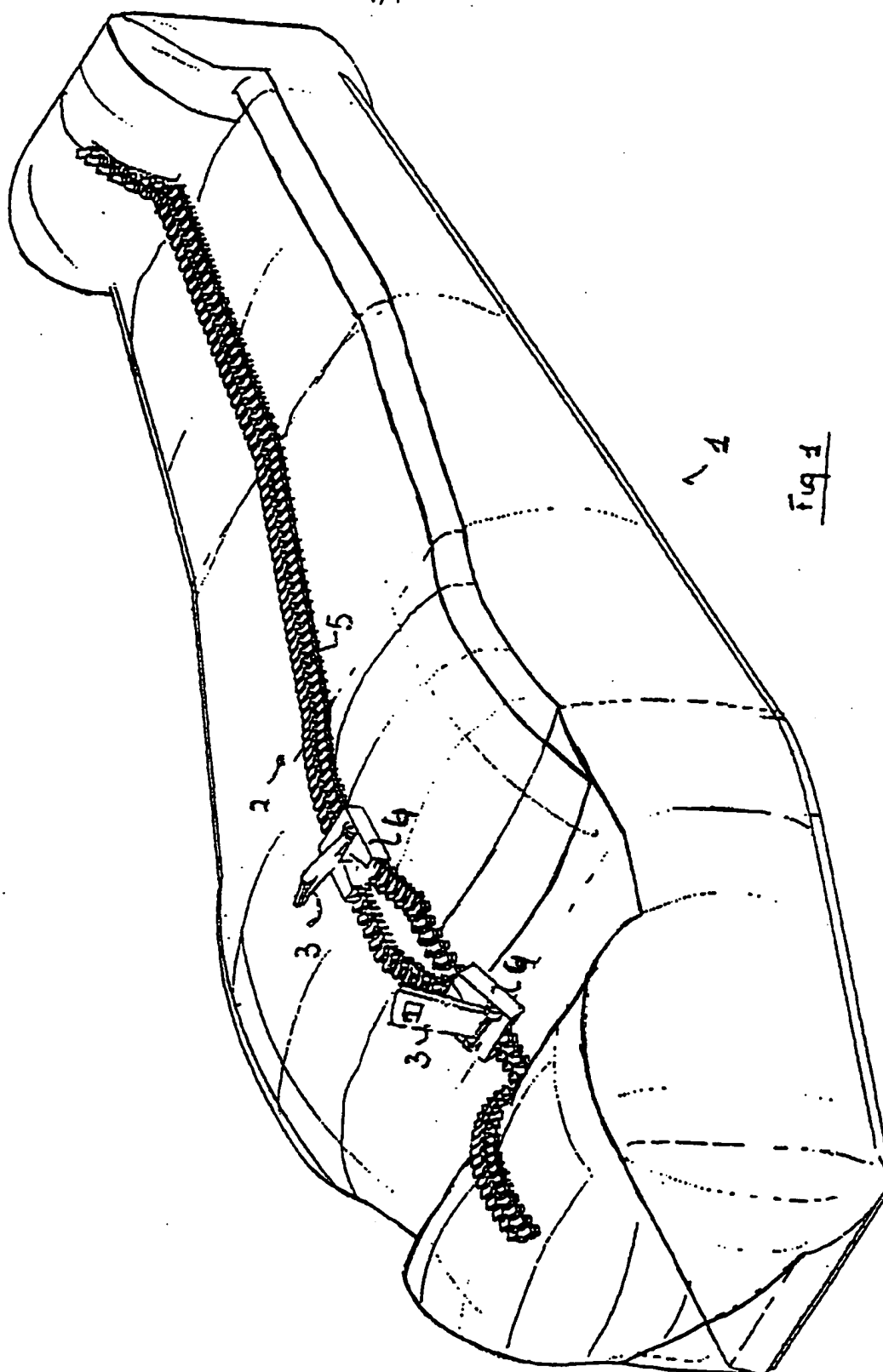
biodegradable material.

8. A zipper according to claim 7, characterized in
that zipper has the properties as specified in
5 German standard DIN 3419.
9. A zipper according to claim 7 or 8, characterized
in that said biodegradable material is a
biodegradable polymer selected from the group
10 comprising cellulose, starch,
polyhydroxoalkanoates, polyurethanes derived from
aliphatic polyesters, polylactic acids,
polycaprolacton or mixtures thereof.
- 15 10. A zipper according to claim 9, characterized in
that said polymer has a base of starch and
caprolacton.
11. A zipper according to claim 10, characterized in
20 that said polymer has a base of the copolymer
polyhydroxybutyrate/valerate.
12. A method for temporarily packaging material in a
container of a substantially flexible material,
25 wherein said material is introduced into the
container through a closable opening and said
container is sealed substantially air-tight by
means of a zipper, wherein said zipper is made of a
biodegradable material.
- 30 13. A method according to claim 12 for temporarily
storing a human or animal body, wherein said body
is placed in a container of a substantially
flexible and preferably biodegradable material,
35 said container is then sealed substantially air-
tight by means of a zipper of a biodegradable
material, and subsequently placed in an environment

which is suitable for biodegradation.

14. A method according to claim 12 for temporarily
packaging material in a container according to any
5 one of the claims 1 - 6, wherein said container is
sealed by means of a zipper according to any one of
the claims 7 - 11, and subsequently placed in an
environment which is suitable for biodegradation.
- 10 15. A bodily fluid-tight article of clothing
substantially made of a biodegradable material,
which comprises at least one biodegradable zipper
according to any one of the claims 7 - 11.

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/NL 98/00545

A. CLASSIFICATION OF SUBJECT MATTER

IPC 6 A61G17/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 6 A61G B65D A44B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 389 130 A (MINNESOTA MINING & MFG) 26 September 1990 cited in the application see page 4, line 53 - line 54 see page 5, line 11 - line 28	1-6, 9-11, 13-15
X	see page 6, line 47 - line 49; figures	7,8,12
Y	DE 40 20 711 A (SOELLNER WOLF) 9 January 1992 see the whole document	1-6, 13-15
Y	WO 96 08535 A (PROCTER & GAMBLE) 21 March 1996 cited in the application see the whole document	6,9-11
	-/-	



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

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Date of the actual completion of the international search

15 December 1998

Date of mailing of the International search report

23/12/1998

Name and mailing address of the ISA

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NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,
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Authorized officer

Godot, T

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Int. J. Application No

PCT/NL 98/00545

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

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Information on patent family members

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